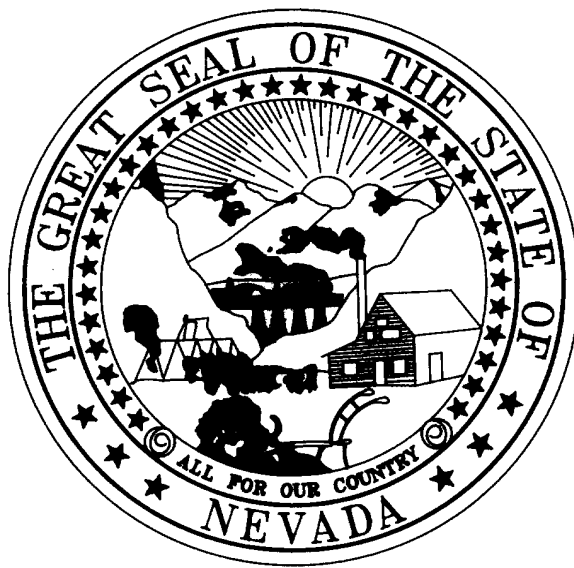


DRAFT
Rationale For Proposed
Changes to NAC 445A.119
Water Quality Criteria For Designated
Beneficial Uses



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DRAFT RATIONALE FOR PROPOSED CHANGES TO NAC 445A.119 WATER QUALITY CRITERIA FOR DESIGNATED BENEFICIAL USES

Background

NDEP is proposing revisions to NAC 445A.119 “Criteria for Water Quality Applicable to Designated Beneficial Uses”. This proposal includes revisions and updates of the water quality criteria contained in the table of NAC 445A.119 to reflect the latest scientific data, recommendations from Environmental Protection Agency (EPA) guidance documents, and the references cited. Proposed revisions to the table are discussed below. A copy of the revised table is attached with the proposed additions shown in ***bold italic*** and deletions shown in ~~strikeout~~.

Proposed Revisions

The EPA “Gold Book” Quality Criteria for Water (U.S. EPA, Pub. No. EPA 440/5-86-001, Quality Criteria for Water, 1986. Office of Water and Hazardous Materials, Washington, D.C.) was added as a reference to the table. The Gold Book was reviewed to update the numerical values listed in the table to reflect EPA’s up-to-date recommended water quality and human health criteria.

Specific changes made to the water quality criteria table include:

- **Temperature Criteria for Water Contact Recreation**

The existing temperature criteria for water contact recreation of 15° to 34° C were recommended in the Water Quality Criteria (Blue Book, EPA, 1972). The most recent EPA criteria contained in the Gold Book (1986) recommends for a 30-minute period, most individuals can tolerate a temperature of 10° C to 35° C without harm.

- **pH Criteria for Water Contact Recreation and Propagation of Wildlife**

The existing pH criteria contained in the table of 6.5 to 8.3 for water contact recreation and 7.0 to 9.2 for propagation of wildlife were based on Blue Book (1972) recommendations. EPA’s most recent guidance (Gold Book, 1986) recommends a pH range of 6.5 to 9.0 for protection of fresh water fish and bottom dwelling invertebrates. This pH range will also be protective of other beneficial uses including water contact recreation and propagation of wildlife.

- **Chloride Aquatic Life Criteria**

The fresh water aquatic life chronic criteria for chloride of 230 mg/L that has been recommended by the EPA (National Recommended Water Quality Criteria, Federal Register, December 10, 1998) has been included in the table. Previously, no chloride criteria had been included in the table, as a specific recommendation for protection of aquatic organisms had not been developed.

- **Nitrites Warm Water Aquatic Life Criteria**

EPA has recommended in the Gold Book (1986) that nitrite levels at or below 5 mg/L should be protective of most warm water fish. Previously, nitrite criteria for protection of warm water fish had not been developed.

- **Ammonia Aquatic Life Criteria**

The existing ammonia aquatic life criteria in the table is expressed as un-ionized ammonia (NH₃) and includes a single-value of 0.02 mg/L for propagation of cold water fish and a “site specific

determination for put and take of cold water fish, and propagation and put and take of warm water fish.

EPA has recommended in the 1999 Update of Ambient Water Quality Criteria for Ammonia (EPA-822-12-99-011, Dec. 1999) that ammonia aquatic life criterion be site specific determinations calculated via equations and expressed on a total ammonia (as N) basis rather than as un-ionized ammonia (NH₃). The equations to determine the pH-dependent acute criteria and the pH and temperature-dependent chronic criteria are included as table footnote 1.

- **Total Dissolved Solids (TDS) for Agricultural Irrigation Use**

Specific TDS criteria in waters for agricultural irrigation use had not been previously recommended.

The most recent EPA criteria contained in the Gold Book (1986) recommends that a TDS concentration of 500 to 1000 mg/L in agricultural irrigation water should not have detrimental effects on sensitive crops. This proposed TDS criteria range is related to the availability of water for plant consumption; the higher the concentration of dissolved solids in the soil water, the less water can be absorbed by the plants.

- ***E. Coli* Criteria for Water Contact and Non Contact Recreation**

The EPA has recommended that *E. coli* be used as an indicator organism to predict the human health risks from pathogens residing in water (Implementation Guidance for Ambient Water Quality Criteria for Bacteria, May 2002, Draft). The recommended geometric mean value, calculated over an annual basis, for *E. coli* that should not be exceeded for recreational activities involving contact with the water is 126 *E. coli* per 100 ml for fresh waters. Fresh water single sample maximum allowable *E. coli* criteria recommended by EPA for water contact recreation range from 235 per 100 ml to 576 per 100 ml, depending on the degree of body contact with the water. For water recreational activities incident to shoreline activities that generally do not involve immersion in the water (non-contact), an *E. coli* criteria equal to five times that of the geometric mean proposed for water recreational uses has been recommended by EPA. EPA has not recommended a non-contact recreational use single-sample maximum value for *E. coli* at this time.

To ensure consistency and continuity in regulatory programs, EPA has recommended that both fecal coliforms and *E. coli* be included in water quality standards for a limited period of time. This approach will allow an adequate database for *E. coli* to be established before removing fecal coliform as the bacterial water quality criteria for water recreational activities.

REVISED WATER QUALITY CRITERIA FOR DESIGNATED BENEFICIAL USES ^{12/4}

Beneficial Uses	Agricultural Use		Cold Water		Aquatic Life Warm Water							
	Irrigation	Watering of Livestock	Propagation	Put & Take	Propagation	Put & Take	Water Contact Recreation	Non-Contact Recreation	Municipal or Domestic Supply	Industrial Supply	Propagation of Wildlife	
Temperature °C	x	x	<----- Site Specific Determination ^{a,b} ----->					x	x	x	x	
pH Units Single Value	4.5-9.0 ^{a,f,h}	5.0-9.0 ^b	$\begin{Bmatrix} 6.5-9.0 \\ a \end{Bmatrix}$	$\begin{Bmatrix} 6.5-9.0 \\ a \end{Bmatrix}$	$\begin{Bmatrix} 6.5-9.0 \\ a \end{Bmatrix}$	$\begin{Bmatrix} 6.5-9.0 \\ a \end{Bmatrix}$	$\begin{Bmatrix} 6.5-8.3 \\ a \end{Bmatrix}$ $\begin{Bmatrix} 6.5-9.0 \\ a \end{Bmatrix}$	x	5.0-9.0 ^a	3.0-11.7 ^b ^a	$\begin{Bmatrix} 7.0-9.2 \\ a \end{Bmatrix}$ $\begin{Bmatrix} 6.5-9.0 \\ a \end{Bmatrix}$	
Dissolved Oxygen Single Value-mg/l	x	Aerobic ^b	5.0 ^b ^a	5.0 ^b ^a	5.0 ^b ^a	5.0 ^b ^a	Aerobic ^b	Aerobic ^b	Aerobic ^b	x	Aerobic ^b	
Chlorides Single Value-mg/l	y ^a	1500 ^f	$\begin{Bmatrix} 1-1 \\ 230 \end{Bmatrix}$	$\begin{Bmatrix} 1-1 \\ 230 \end{Bmatrix}$	$\begin{Bmatrix} 1-1 \\ 230 \end{Bmatrix}$	$\begin{Bmatrix} 1-1 \\ 230 \end{Bmatrix}$	x	x	250 ^a /400 ^c	--	1500 ^f	
Total Phosphates as P Single Value-mg/l	x	x	<----- Site Specific Determination ^{a,b,e} ----->					<----- Site Specific Determination ^{b,c,e} ----->				
Nitrates as N Single Value-mg/l	x	100 ^{f,h} ^b	y ^b ^a	x	90 ^b ^a	90 ^b ^a	x	x	10 ^{b,c,e} ^a	x	100 ^{f,h} ^b	
Nitrites as N Single Value-mg/l	x	10 ^{f,h} ^b	0.06 ^b ^a	0.06 ^b ^a	$\begin{Bmatrix} 1-1 \\ 5 \end{Bmatrix}$	$\begin{Bmatrix} 1-1 \\ 5 \end{Bmatrix}$	x	x	1.0 ^a , ^b ^a	x	10 ^{f,h} ^b	
Total Nitrogen as N Single Value-mg/l	x	x	<----- Site Specific Determination ^a ----->					<----- Site Specific Determination ^{b,c,e} ----->				
[Un-ionized Ammonia as NH ₃ Single Value-mg/l]	$\begin{Bmatrix} 1-1 \end{Bmatrix}$	$\begin{Bmatrix} 1-1 \end{Bmatrix}$	$\begin{Bmatrix} 0.02 \\ b,e \end{Bmatrix}$	<--- Site Specific Determination --->			$\begin{Bmatrix} 1-1 \end{Bmatrix}$	$\begin{Bmatrix} 1-1 \end{Bmatrix}$	$\begin{Bmatrix} 0.5 \end{Bmatrix}$ $\begin{Bmatrix} \text{Total NH}_3\text{-N} \end{Bmatrix}$	$\begin{Bmatrix} 1-1 \end{Bmatrix}$	$\begin{Bmatrix} 1-1 \end{Bmatrix}$	
Total Ammonia as N Single Value (mg/L)	x	x	<--- Site Specific Determination (Footnote 1) ---> Freshwater Criteria are pH and Temp. Dependent					x	0.5 ^b	x	x	

REVISED WATER QUALITY CRITERIA FOR DESIGNATED BENEFICIAL USES ^{12/4}

Beneficial Uses	Agricultural Use		Aquatic Life		Water Contact Recreation	Non-Contact Recreation	Municipal or Domestic Supply	Industrial Supply	Propagation of Wildlife
	Irrigation	Watering of Livestock	Cold Water	Warm Water					
Total Dissolved Solids Single Value-mg/l	1-1 500-1000 ^a	3000 ^{(a) b}	x	x	x	x	500 ^a /1000 ^{(a) d}	x	x
Color (PT-CO), Single Value	x	x	x	x	x	x	75 ^b	x	x
Turbidity, Single Value-NTU	x	x	10 ^{(d) e}	50 ^{(d) e}	50 ^{(d) e}	x	y ^{(b) a}	x	x
Fecal Coliform (MF/100ml) Geometric Mean Single Value	x ^{(a) b} 1000 ^{(a) b}	x ^{(a) b} 1000 ^{(a) b}	x ^{(a) b} x ^{(a) b}	x ^{(a) b} x ^{(a) b}	x ^{(a) b} x ^{(a) b}	1000 ^{(a) b} 2000 ^{(a) b} See Footnote 2	x ^{(a) b} 2000 ^{(a) b}	x ^{(a) b} x ^{(a) b}	x ^{(a) b} 1000 ^{(a) b}
E.Coli (MF/100 ml) Geometric Mean Single Value	x ^{(a) b} x ^{(a) b}	x ^{(a) b} x ^{(a) b}	x ^{(a) b} x ^{(a) b}	x ^{(a) b} x ^{(a) b}	x ^{(a) b} x ^{(a) b}	630 ^a x ^{(a) b} See Footnote 3	x ^{(a) b} x ^{(a) b}	x ^{(a) b} x ^{(a) b}	x ^{(a) b} x ^{(a) b}
Alkalinity as CaCO ₃ Single Value-mg/l	x	x	Less than 25% change from natural conditions ^{a (d)}		x	x	x	x	30-130 ^{(a) b}
Suspended Solids Single Value-mg/l	x	x	25-80 ^{(a) b}	25-80 ^{(a) b}	25-80 ^{(a) b}	x	x	x	x
Sulfate Single Value-mg/l	x	x	x	x	x	x	250 ^{(a) b} /500 ^(d)	x	x

FOOTNOTES AND REFERENCES

- < means less than
- > means greater than
- x means a specific recommendation has not been developed
- y means the cited reference recommended no value be established

- (1) U.S. Environmental Protection Agency, Pub. No. EPA 822-R-99-014, 1999 Update of Ambient Water Quality Criteria for Ammonia (December 1999). Office of Water, Washington, D.C.

Total Ammonia Criteria is Temperature and/or pH dependent and determined by the following equations:

Aquatic Life “Acute” Criteria = $(0.275/1+10^{(7.204-pH)}+39/1+10^{(pH-7.204)})$ for cold water aquatic life;

Aquatic Life “Acute” Criteria = $(0.411/1+10^{(7.204-pH)}+58.4/1+10^{(pH-7.204)})$ for warm water aquatic life;

Aquatic Life “Chronic” Criteria = $(0.0577/1+10^{(7.688-pH)}+2.487/1+10^{(pH-7.688)})(\text{MIN}(2.85, 1.45(10^{(0.028(25-T))})))$ when fish early life stages are expected to be present;

Aquatic Life “Chronic” Criteria = $(0.0577/1+10^{(7.688-pH)}+2.487/1+10^{(pH-7.688)})(1.45(10^{(0.028(25-\text{MAX}(T,7))})))$ when fish early life stages are expected to be absent.

- (2) Based on a minimum of five samples taken over a 30-day period, the Fecal Coliform bacterial level must not exceed the applicable geometric mean nor may more than 10 percent of the total samples taken during any 30-day period exceed the applicable single value criterion.
- (3) Recommended *E. coli* water quality criteria requires that the geometric mean calculated over annual basis to not exceed the criterion and the single sample maximum to be met for a waterbody to be fully supportive of its intended use.
- (4) The table is not all-inclusive. As the need arises and data becomes available, appropriate revisions and additions will be made.
 - a. U.S. Environmental Protection Agency, Pub. No. EPA 440/5-86-001, Quality Criteria for Water (Gold Book) (1986). Office of Water and Hazardous Materials, Washington, D.C.
 - b. National Academy of Sciences, Water Quality Criteria (Blue Book)(1972).
 - c. U.S. Environmental Protection Agency, National Recommended Water Quality Criteria, Federal Register, December 10, 1998.
 - d. State of Nevada, Health Division, BHPS, NAC 445A.455, Secondary Drinking Water Standards.
 - e. Report of the Commission on Water Quality Criteria (FWPCA)(Green Book)(1968).
 - f. McKee and Wolf, California State Water Resources Control Board, Water Quality Criteria (1963).